

High-Definition Multimedia Interface

Version 2.0

Quantum Data MOI v1.0

Test ID: HF1-28

April 22, 2015

Preface

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Document Revision History

1.0 April 22, 2015 - Initial Release.

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Contact Information

The URL for the HDMI Forum web site is: <http://www.hdmiforum.org/>

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Introduction

This document provides a set of Method of Implementation for test method described in HDMI Compliance Test Specification Version 2.0 (HDMI CTS 2.0). HDMI Forum created HDMI CTS 2.0 to specify a set of tests that should be performed to verify features described in HDMI Specification Version 2.0.

Scope

This document provides testing procedures for HDMI CTS 2.0 Test ID HF1-28: Source AVI InfoFrame and GCP – 6G – Non-2160p.” The procedure below deals with single resolution and only one Test ID is considered at a time.

References

Normative References

High-Definition Multimedia Interface Specification Version 1.4b, October 11, 2011.
HDMI Compliance Test Specification Version 1.4b, October 11, 2011.
High-Definition Multimedia Interface Specification Version 2.0, August, 2013.
HDMI Compliance Test Specification Version 2.0.

Informative Reference

No additional informative references.

Test ID HF1-28: Source AVI InfoFrame and GCP – 6G – Non-2160p

Objective

Confirm that the Source, whenever transmitting any non-2160p Video Timing with a TMDS Character Rate that is greater than 340Mcsc, transmits an accurate AVI InfoFrame at least once every two video fields and appropriate color depth as indicated by GCP.

Table 7-91 Source AVI InfoFrame and GCP – 6G – Non-2160p Requirements

Reference	Requirement
[HDMI 2.0: 7.2.2] BT.2020 Colorimetry	<See reference for details>
[HDMI 2.0: 10.1] Use of the AVI InfoFrame in This Specification	<See reference for details>

Capability(s)

The Source DUT supports any non-2160p Video Timing/color mode with a TMDS Character Rate that is greater than 340Mcsc.

Test Equipment

Item	Generic Equipment	Vendor Specific Equipment	Quantity
1	HDMI 2.0 Protocol Analyzer	980 Advanced Test Platform series: 980 HDMI 2.0 Protocol Analyzer module HDMI CTS 2.0 Compliance Test Package #3	1

Generic Procedure

- 1 If CDF field Source_Above_340 is “N”, then SKIP this test.

Setup:

- 2 Connect the Source DUT to the Protocol Analyzer.
- 3 Configure the EDID, which indicates all Video Timings necessary for this test.

Measure:

- 4 For each Video Timing listed in the CDF fields
Source_non_2160p_Video_Formats_Above_340,
Source_non_2160p_Video_Formats_Above_340_DC and
Source_non_2160p_Video_Formats_Above_340_3D, perform the following:
 - 4.1 Operate the Source DUT to output the tested Video Timing.

- 4.2 Capture and descramble the data (except for one unscrambled Control Period per field) and verify the tested Video Timing as follows:
[Verify that at least one AVI InfoFrame is transmitted for every two video fields]
- 4.3 If AVI InfoFrame does not occur at least once per two Video Fields, then FAIL.
[Verify that only a V2 AVI InfoFrame is transmitted whenever that the VIC field is correctly filled]
- 4.4 If byte HB1 (InfoFrame_version) is not equal to 2, then FAIL.
- 4.5 If the Source DUT is outputting a Video Timing that is defined in CEA-861-F:
 - 4.5.1 If the transmitted AVI InfoFrame[VIC] does not correspond to one of the Video Identification Codes corresponding to the transmitted Video Timing, then FAIL
- 4.6 If the Source DUT is outputting a Video Timing that is not defined in CEA-861-F:
 - 4.6.1 If the transmitted AVI InfoFrame[VIC] is not equal to 0x00, then FAIL.
- [All reserved fields in the AVI InfoFrame are zero]
- 4.7 If PB1 bit 7 is not equal to 0, then FAIL.
- 4.8 If PB4 bit 7 is not equal to 0, then FAIL.
- 4.9 If any byte PB14 to PB27 is not equal to 0, then FAIL.
- 5 If the CDF field Source_ITURBT2020_101 is "Y", then,
 - 5.1 Configure the EDID with a Colorimetry Data Block including ITU-R BT.2020 Y'CC'BCC'RC colorimetry (Byte #3 = 0x20).
 - 5.2 Operate the Source DUT to output an ITU-R BT.2020 Y'CC'BCC'RC content signal.
 - 5.3 If AVI InfoFrame does not occur at least once per two Video Fields, then FAIL.
 - 5.4 In the transmitted AVI InfoFrame:
 - 5.4.1 If the fields C1 and C0 do not indicate Extended Colorimetry (1,1), then FAIL.
 - 5.4.2 If the fields EC2, EC1 and EC0 do not indicate ITU-R BT.2020 Y'CC'BCC'RC (1,0,1), then FAIL.
 - 5.4.3 If Y2,Y1,Y0 indicates ITU-R BT.2020 R'G'B' is used (0,0,0), then FAIL.
 - 5.4.4 If Y2,Y1,Y0 indicates Y'C'BC'R 4:4:4 (0,1,0) is used, then check the transmitted GCP (HB0 = 0x03) as follows:
 - 5.4.4.1 If SB1[CD3,CD2,CD1,CD0] does not indicate either 3066 30-bit (0101b), 36-bit (0110b), or 48-bit (0111b), then FAIL.
 - 5.5 Configure the EDID with a Colorimetry Data Block indicating no support for Extended Colorimetry (Byte #3 = 0).

- 5.6 Operate the Source DUT to output an ITU-R BT.2020 Y'CC'BCC'RC content signal.
- 5.7 If any video field contains an AVI InfoFrame with fields C1 and C0 indicating Extended Colorimetry (1,1), then FAIL.
- 6 If the CDF field Source_ITURBT2020_110 is "Y" then:
 - 6.1 Configure the EDID with a Colorimetry Data Block indicating ITU-R BT.2020 R'G'B' or Y'C'BC'R colorimetry (Byte #3 = 0xC0).
 - 6.2 Operate the Source DUT to output an ITU-R BT.2020 R'G'B' or Y'C'BC'R content signal.
 - 6.3 If AVI InfoFrame does not occur at least once per two Video Fields, then FAIL.
 - 6.4 In the transmitted AVI InfoFrame:
 - 6.4.1 If the fields C1 and C0 do not indicate Extended Colorimetry (1,1), then FAIL.
 - 6.4.2 If the fields EC2, EC1 and EC0 do not indicate ITU-R BT.2020 R'G'B' or Y'C'BC'R Colorimetry (1,1,0), then FAIL.
 - 6.4.3 If Y2,Y1,Y0 indicates ITU-R BT.2020 R'G'B' (0,0,0) or Y'C'BC'R 4:4:4 (0,1,0) is used, then check the transmitted GCP (HB0 = 0x03) as follows:
 - 6.4.3.1 If SB1[CD3,CD2,CD1,CD0] does not indicate either 30-bit (0101b),36-bit (0110b), or 48-bit (0111b), then FAIL.
 - 6.5 Configure the EDID with a Colorimetry Data Block including Byte #3 = 0 (i.e. Indicate no support for Extended Colorimetry).
 - 6.6 Operate the Source DUT to output an ITU-R BT.2020 R'G'B' or Y'C'BC'R content signal.
 - 6.7 If any video field contains an AVI InfoFrame with fields C1 and C0 indicating Extended Colorimetry (1,1), then FAIL.

Vendor Specific Test Procedure

Test Equipment

A variety of equipment is needed for testing HDMI products. Each piece is authorized and included by name in this Compliance Test Specification. This section describes the Quantum Data test equipment.

HDMI 2.0 Protocol Analyzer module

The Quantum Data 980 HDMI 2.0 Protocol Analyzer module can be installed in the 980B or 980R series Advanced Test Platforms. This 980 HDMI 2.0 Protocol Analyzer module serves the generic test functions called out in the HDMI 2.0 Generic CTS. Refer to the table below:

Item	Quantum Data Equipment	
1	980 Advanced Test Platform series:	
	Equipped with:	980 HDMI 2.0 Protocol Analyzer module
		HDMI CTS 2.0 Compliance Test Package #3

980 HDMI 2.0 Protocol Analyzer Module with 980 Series Platform Configurations

The figures below show depictions of the 980 HDMI 2.0 Protocol Analyzer module equipped in various 980 series platforms. **Note:** Card positioning may vary depending on configuration.



Source AVI InfoFrame and GCP – 6G – Non-2160p

Test ID HF1-28: Source AVI InfoFrame and GCP – 6G – Non-2160p

1. Objective

Confirm that a 3D Audio (L-PCM) capable Sink supports 3D Audio Sample Packets and signaling.

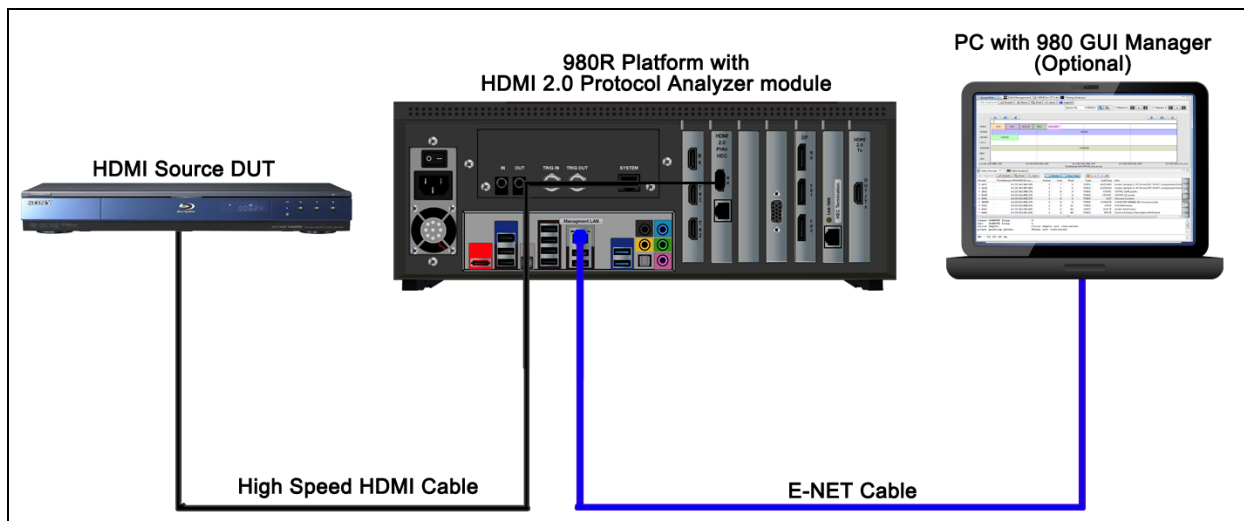
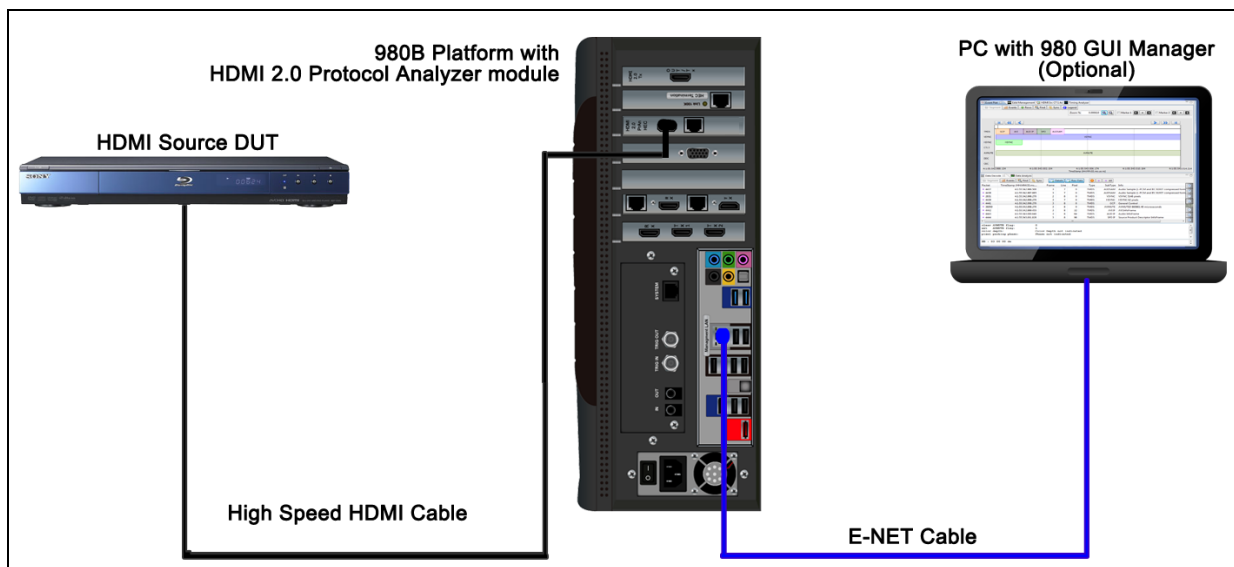
2. Test Overview

The Pass/Fail criteria is assessed by the application with no human examination required.

3. Procedure

Use the following procedure to conduct this test.

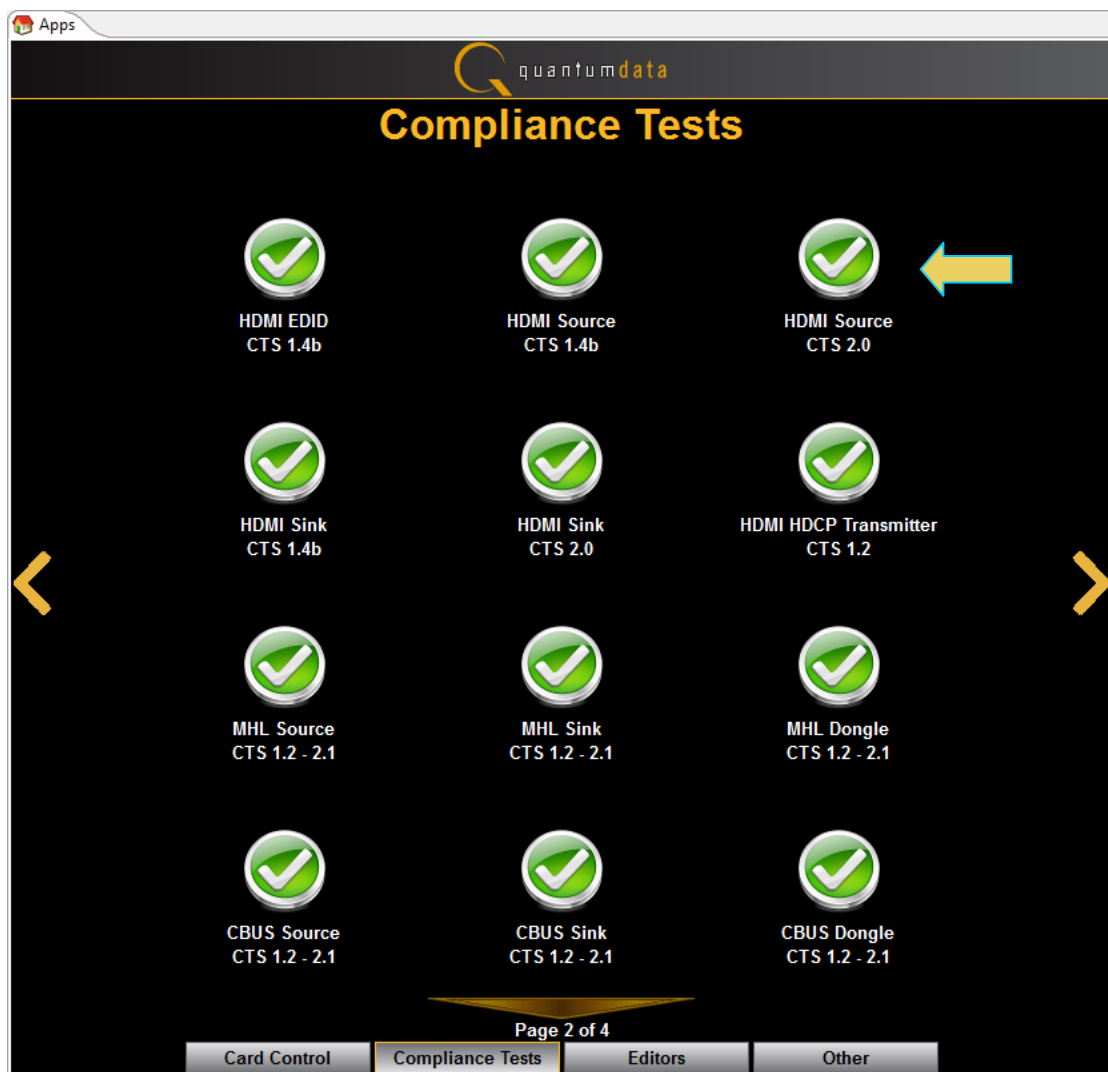
- 1 Connect Source DUT to the Quantum Data 980 HDMI 2.0 Protocol Analyzer at the module's port labeled Rx. Use a High Speed HDMI cable. The figures below show depictions of connections to the 980 HDMI 2.0 Protocol Analyzer module residing in the 980 series chassis.



- 2 Operate the Source DUT to output the supported 3D audio formats.
- 3 Use Quantum Data 980 Embedded Manager GUI (touchscreen) or invoke Quantum Data 980 External Manager GUI (Windows application).

Note: You will not need to connect the PC shown in the figures above if you are running the compliance test through the 980's embedded display. The PC running the 980 HDMI Protocol Analyzer module's compliance test application is connected to the 980 through a standard Ethernet cable.

- 4 Complete the following steps:
 - 4.1 Click on the HDMI Source CTS 2.0 icon in the Compliance Tests page of the Apps panel.



- 4.2 Navigate to the CDF tab if not already there. If there is a saved CDF file, then click on Open and select it. Otherwise, enter the DUT's CDF information for each tab and optionally click on Save to save the CDF.

HDMI 2.0 Src CT 2.0

CDF Entry Test Selection Test Options / Preview

Open New Save CDF File: /CDF/XYZ_Source

General Y420 Video 21:9 (64:27) Video 6G Video 50p Timings

Source_ITURBT_2020_101 Does the DUT support ITU-R BT.2020 Y'CC'BCC'RC Colorimetry?
☐ Yes ☒ No

Source_ITURBT_2020_110 Does the DUT support ITU-R BT.2020 Y'C'BC'R Colorimetry?
☐ Yes ☒ No

Source_LTE_340Mscsc_Scrambling Does the product support scrambling for TMDS Character Rates at or below 340Mscsc?
☐ Yes ☒ No

Source_Above_340 Does the product support any Video Format/color mode for TMDS Character Rate above 340Mscsc up to 600Mscsc?
☒ Yes ☐ No

Source_2160p_Video_Formats_Above_340

(96) 3840x2160p @ 50 Hz 16:9	<input checked="" type="radio"/> Yes <input type="radio"/> No
(97) 3840x2160p @ 60 Hz 16:9	<input checked="" type="radio"/> Yes <input type="radio"/> No
(101) 4096x2160p @ 50 Hz 256:135	<input type="radio"/> Yes <input checked="" type="radio"/> No
(102) 4096x2160p @ 60 Hz 256:135	<input type="radio"/> Yes <input checked="" type="radio"/> No
(106) 3840x2160p @ 50 Hz 64:27	<input checked="" type="radio"/> Yes <input type="radio"/> No
(107) 3840x2160p @ 60 Hz 64:27	<input checked="" type="radio"/> Yes <input type="radio"/> No

Source_2160p_DC_Video_Formats_Above_340

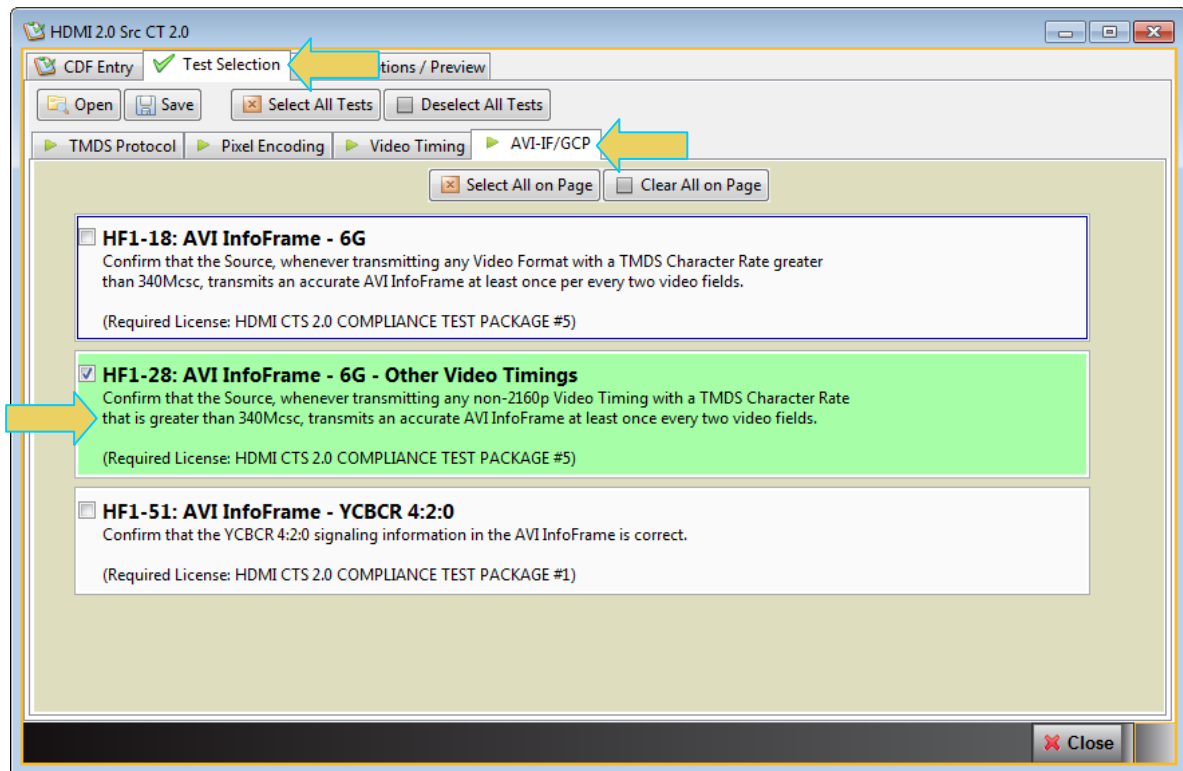
Format	30	36	48	(bits per pixel)
(93) 3840x2160p @ 24 Hz 16:9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(bits per pixel)
(94) 3840x2160p @ 25 Hz 16:9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(bits per pixel)
(95) 3840x2160p @ 30 Hz 16:9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(bits per pixel)
(98) 4096x2160p @ 24 Hz 256:135	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(bits per pixel)
(99) 4096x2160p @ 25 Hz 256:135	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(bits per pixel)
(100) 4096x2160p @ 30 Hz 256:135	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(bits per pixel)
(103) 3840x2160p @ 24 Hz 64:27	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(bits per pixel)
(104) 3840x2160p @ 25 Hz 64:27	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(bits per pixel)
(105) 3840x2160p @ 30 Hz 64:27	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(bits per pixel)

Source_2160p_3D_Video_Formats_Above_340

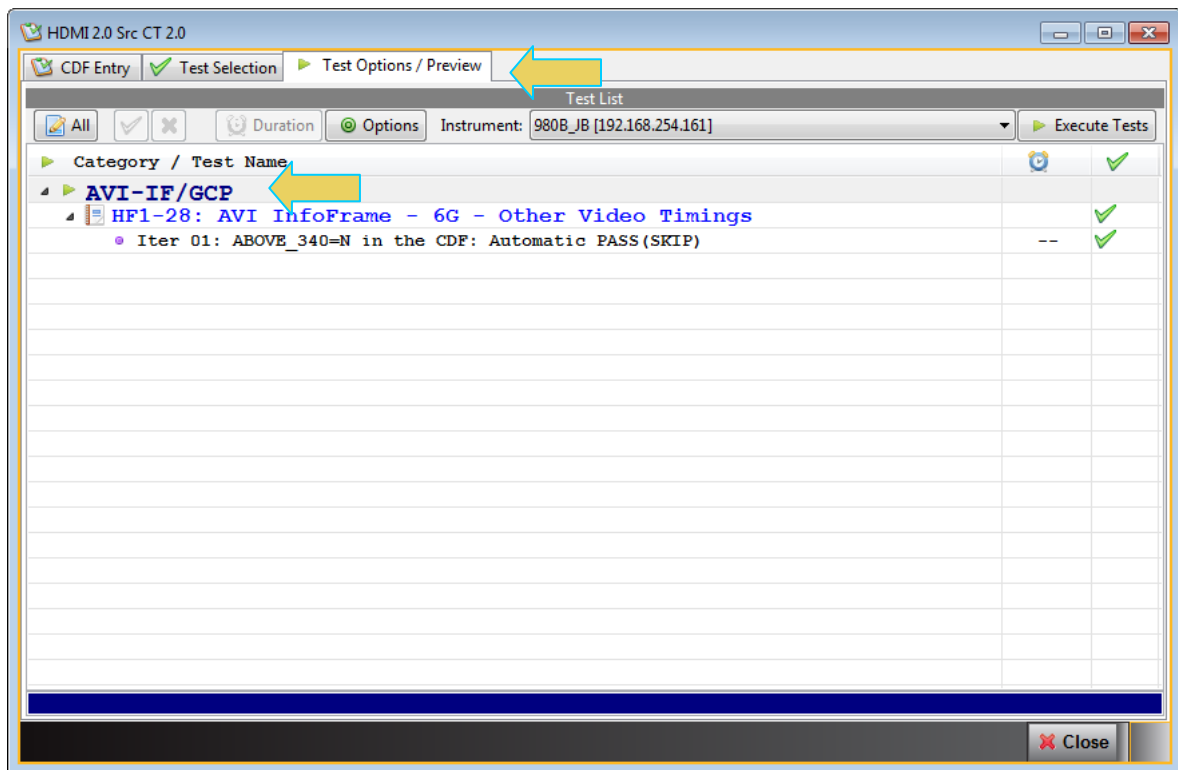
(95) 3840x2160p @ 30 Hz 16:9 - Frame Packing	<input type="radio"/> Yes <input checked="" type="radio"/> No
(94) 3840x2160p @ 25 Hz 16:9 - Frame Packing	<input type="radio"/> Yes <input checked="" type="radio"/> No
(93) 3840x2160p @ 24 Hz 16:9 - Frame Packing	<input type="radio"/> Yes <input checked="" type="radio"/> No
(98) 4096x2160p @ 24 Hz 256:135 - Frame Packing	<input type="radio"/> Yes <input checked="" type="radio"/> No
(100) 4096x2160p @ 30 Hz 256:135 - Frame Packing	<input type="radio"/> Yes <input checked="" type="radio"/> No
(99) 4096x2160p @ 25 Hz 256:135 - Frame Packing	<input type="radio"/> Yes <input checked="" type="radio"/> No
(97) 3840x2160p @ 60 Hz 16:9 - Side-by-Side (Half)	<input checked="" type="radio"/> Yes <input type="radio"/> No
(96) 3840x2160p @ 50 Hz 16:9 - Side-by-Side (Half)	<input checked="" type="radio"/> Yes <input type="radio"/> No

Close

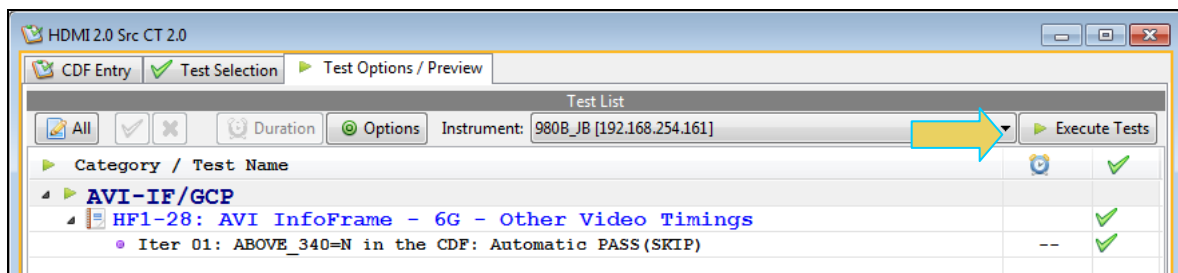
- 4.3 Click on the Test Selection tab and the AVI-IF/GCP sub tab and select the Test ID HF1-28: Source AVI InfoFrame and GCP – 6G – Non-2160p Test. Refer to the sample screen below.



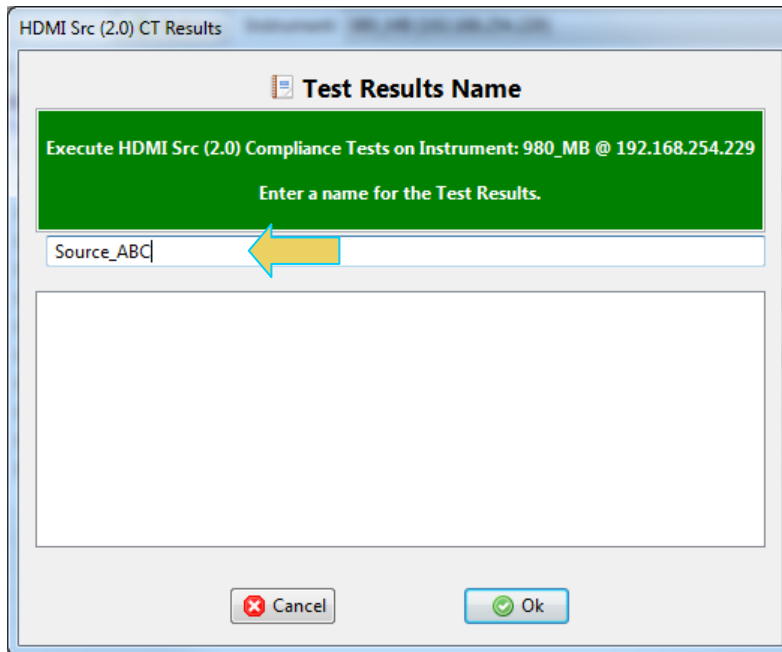
- 4.4 Click on Test Options / Preview tab and review the list of tests. Refer to the sample screen below.



4.5 Click on Execute tests activation button to initiate the test. Refer to the sample screen below.



Note: You will be prompted with a dialog box to assign a name to the test results. Refer to the screen example below:



Enter a name, click OK and the test will begin.

A Test Window will appear (below) indicating the progress of the test.

You will be prompted with a dialog box informing you of the requirements of the source DUT. Verify that the source is outputting the required HDMI format and pixel encoding and press Continue to run the test.

- 5 If the 980 HDMI Protocol Analyzer's compliance test application reports PASS, then PASS.
If the 980 HDMI Protocol Analyzer's compliance test application reports FAIL, then FAIL.

